Interlayer Charge Disproportionation of the Weakly Incoherent Layered Organic Superconductor

\( \kappa_{\text{H}}\text{-}(\text{DMEDO-TSeF})_2\text{[Au(CN)₄]}(\text{THF}) \)

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Organic superconductors \( \kappa_{\text{L}} \) and \( \kappa_{\text{H}}\text{-}(\text{DMEDO-TSeF})_2\text{[Au(CN)₄]}(\text{THF}) \) have the same chemical composition [1]. Although the \( \kappa_{\text{L}} \) phase has disordered THF molecules and shows a structural phase transition at \( T_d = 209 \text{ K} \) [2], THF of the \( \kappa_{\text{H}} \) phase is ordered even at room temperature. The \( \kappa_{\text{H}} \) phase has two crystallographically independent \( \kappa \)-type conducting layers. The background shape of the angular-dependent magnetoresistance of the \( \kappa_{\text{H}} \) phase depends on the magnetic field strength (Fig. 1). The resistance peak under the magnetic field nearly parallel to the conducting layer is scaled by \( B \cos(\theta) \). This indicates that the resistance peak is not a coherence peak but a weak localization effect, and the present compound is a weakly incoherent layered system [3]. However, the Shubnikov-de Haas oscillations show two closed orbits with nearly 100% of the first Brillouin zone (Fig. 2). This indicates that the band filling of the crystallographically independent layer differs. The characteristic arrangement of the polar THF molecule in the insulating layers is the origin of the interlayer charge disproportionation.